

BELLCOMM, INC.

SUBJECT: Uprated Saturn I & Saturn V
Configuration Difference
Charts - Case 330

DATE: September 11, 1967
FROM: T. L. Powers

MEMORANDUM FOR FILE

Attached are charts of significant differences in the configuration of the Uprated Saturn I and the Saturn V vehicles. The purpose of these charts is to display the maturation of the program toward an eventual hardware configuration. The level of detail varies in accordance with the effect of a change on program flexibility and the degree of interest in the Apollo Program Office.

The information for these charts was gathered primarily from the Uprated Saturn I and Saturn V Program Offices, and the Propulsion and Vehicle Engineering, Aero-Astrodynamic and Astrionics Laboratories at MSFC. We wish to acknowledge with appreciation their cooperation and also that of other groups in Bellcomm. The charts were prepared by A. T. Ackerman and W. O. Campbell in the Launch Vehicle Subsystems Group under the supervision of J. J. O'Connor.

2031-WOC-aj1

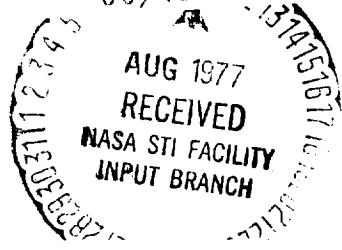
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Attachments

Saturn I Configuration Chart

Saturn V Configuration Chart

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N79-72170
NASA CR-154726 (NASA-CR-154726) UPATED SATURN 1 AND
SATURN 5 CONFIGURATION DIFFERENCE CHARTS
(Bellcomm, Inc.) 5 p
00/15 12517
Unclassified



UPRATED SATURN I SIGNIFICANT CONFIGURATION DIFFERENCES

LEGEND	NO OF ENTRIES	20I	202	203	204	205	206	207	208	209	210	211	212
STRUCTURES	6												
PROPELLION	13												
ELECTRICAL	6												
ENV CONTROL	5												
INSTR	11												
S-IB	41												
S-IVB													
MULTI-STAGE													
20I		202	203	204	205	206	207	208	209	210	211	212	

STRUCTURES

- REMOVED ENGINE FAIRING - REDUCED GIMBAL RATE REQ.
- SATURN TANKS
- STRENGTHEN OUTER LOX TANK FORWARD SKIRT
- REMOVE TURBINE EXHAUST FAIRINGS FOR OVERBOARD DUMP
- (STEEL) TITANIUM HELIUM SPHERES
- LIGHTEN ENGINE HEAT SHIELD & FLEXIBLE CURTAIN - REDUCED BASE HEATING
- LOX VENT HIGHER IN TANK - LOAD MORE LOX
- INVERTED SUMP COVER, CENTER LOX TANK - REDUCED RESIDUALS
- SMALLER PRESSURE SPHERE - REDUCED PURGE REQ.
- UPGRADED 1-1 ENGINE - 200 TO 205 K @ SEA LEVEL
- REMOVE R & D CONTINUOUS LIQUID LEVEL SENSING SYSTEM
- SEPARATION CAMERAS

PROPELLION

- HEAVY AFT SKIRT - GREATER AERO LOADS
- VENTS & HA SPHERES - J-2 RESTART SIMULATION
- OPEN LOOP PROPELLANT UTILIZATION SYSTEM - LH₂ RESIDUALS RECD
- LARGER PNEUMATIC'S SPHERE - ORBITAL VENT REQ / 3.7 PSI REDUCTION OF LH₂ ULLAGE PRESSURE - LOWER NPSP REQ
- CALIPS-TYPE THRUST OK SWITCHES FOR REMOTE CHECKOUT
- UPGRADED 1-2 ENGINE - 225 TO 230K @ 55°OF
- REDISEIGN SEQUENCEE - INCREASED RELIABILITY
- FORWARD SKIRT VENT AREA IN² = 100
- FLUTTER MEASUREMENT OF FORWARD SKIRT
- ADDITIONAL STRAIN GAES
- COMPONENT INSULATION - IN ORBIT ENVIRONMENTAL REQUIREMENT
- COMPONENT HEATERS
- REUNDUNDANT TRANSMISSION TO MCC VIA S-IVB & IU
- PROPELNT DUMP | DUMP AND VENT → FAIL-IN-LAST POSITION VENT VALVE KIT - ORBITAL SAFING
- EDS RATE GYRO FILTER - AVOID FALSE ABORTS
- CLOSED
- LOOP
- EDS
- EDS RATE LIMIT SWITCHING - S-IB VS S-IVB
- SPACECRAFT OVERRIDE OF S-IVB ATTITUDE
- IN-ORBIT ENVIRONMENTAL REQUIREMENT
- REUNDUNDANT COOLANT PUMP - RELIABILITY
- TV CAMERAS → DEPLOYMENT OF SLA PANELS
- S-BAND → TRANSMISSION OF LH₂ TANK TV
- DIGITAL COMMAND SYSTEM - IU GUIDANCE UPDATE
- ADD C-BAND TRANSPONDER → 360° COVERAGE

R&D INSTRUMENTATION

- SECURE RANGE COMMAND SYSTEM

ENV CONTROL

- REDUNDANT SWITCH SELECTOR

INSTR

- S-IB, S-IVB, IU
- S-IB, S-IVB, IU
- S-IB, S-IVB

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SATURN V SIGNIFICANT CONFIGURATION DIFFERENCES

LEGEND	NO OF ENTRIES	501	502	503	504	505	506	507	508	509	510	511	512
STRUCTURES	12												
PROPELLION	7												
ELECTRICAL	5												
ENV CON	-												
INSTR	7												
S-I C	31												
R & D INSTRUMENTATION													
TV & CAMERAS													
SEVERAL CHANGES OF (AL)													
STRUCTURAL BEEF UP: DUAL PLANE SEPARATION JOINTS													
(STEEL) (AL)													
LIGHTWEIGHT STRUCTURE - 1230 LB (SPL - 80 LB)													
REMOVE ENGINE AIR SCROPS - REDUCED BASE HEATING													
LENGTHEN STANDPIPE - EARLY CENTER ENGINE CUT-OFF (CECO) & REDUCED RESIDUALS													
DISCRETE													
DISCRETE													
LOW LEVEL SENSOR - CECO													
LOX LOADING PROBE HIGHER IN TANK - LOAD MORE LOX													
IMPROVED F-1 INJECTOR - 3 SECOND ^{1/2} INCREASE & IMPROVED COMBUSTION STABILITY													
R & D INSTRUMENTATION													
TV & CAMERAS													
BOATTAIL AND SIC SEPARATION													
S-II													
SEVERAL CHANGES OF (AL)													
STRUCTURAL BEEF UP: DUAL PLANE SEPARATION JOINTS													
(STEEL) (AL)													
LIGHTWEIGHT STRUCTURE - 4000 LB (SPL = 1330 LB)													
THICKER AFT LOX BULKHEAD - GREATER LOX LOAD													
SPRAY FOAM - LH ₂ FORWARD BULKHEAD													
SPRAY FOAM - LH ₂ TANK WALLS													
UPGRADED J-2 ENGINE - 225 TO 230 K @ 5.5 O/F													
INDEPENDENT POWER SOURCE FOR EACH EDS PRESSURE TRANSDUCER													
REPLACE 35 AH BATTERY WITH 25 AH - REDUCED POWER REQ'T													
R & D INSTRUMENTATION													
CAMERAS													
DUAL-PLANE SEPARATION													
ULLAGE PRESSURE REDUCED FROM 36 TO 33 PSI - LOWER ENGINE NPSH REQ'T													
S-IV B													
KIT													
MEAS KIT													
FLUTTER KIT - RING STIFFENERS ON FORWARD SKIRT													
STRUCTURAL BEEF UP OF INTERSTAGE AFT JOINT													
ADD O ₂ /H ₂ BURNER - REPRESSURIZATION													
UPGRADED J-2 ENGINE - 225 TO 230 K @ 5.5 O/F													
INDEPENDENT POWER SOURCE FOR EACH EDS PRESSURE TRANSDUCER													
REDUCED INSTRUMENTATION BATTERY CAPACITY - 306 AH TO 179 AH - REDUCED POWER REQ'T													
R & D INSTRUMENTATION													
MOD INSTR													
MODIFIED FOR 503N													
LH ₂ TANK THERMAL MEASUREMENTS													
STRUCTURAL BEEF UP: URSIA JOINT													
REMOVE INSTRUMENTATION BATTERY													
R & D INSTRUMENTATION													
501	502	503	504	505	506	507	508	509	510	511	512		

MAS/Ballcomm
Sept 1, 1967
J.J. Connor
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